

Contamination in Pasir Gudang Area, Peninsular Malaysia: What can we learn from Kim Kim River chemical waste contamination?

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Abstract— This paper reviews monitoring studies of chemical pollutant in the Straits of Johore, especially in Pasir Gudang area. The Kim Kim River chemical waste pollution occurred in March 2019 is reviewed for comparison with the previously reported scientific data. It is concluded that reporting monitoring data in the scientific literature is just a knowledge sharing without any practical implications. Only heavy pollution cases involving human health implications would trigger governing bodies' immediate actions. Therefore, reports of scientific monitoring data should be treated with high importance and governing bodies should be working closely with those researchers for the benefits of public at large. It is recommended that 'Polluters Pay Principle' should be fully adopted in line with stricter laws and regulations with effective management of clean river sustainability in Malaysia.

Keywords— River pollution; Kim Kim River; River management.

MONITORING STUDIES IN THE STRAITS OF JOHORE

The Straits of Johore is considered a hotspot area for potentially receiving a lot of anthropogenic inputs due to its vicinity to many industries such as transportation and logistics, shipbuilding, petrochemicals and other heavy industries, and oil palm storage and distribution. Pasir Gudang is an industrial town located in Johor Bahru District, which becomes infamous because of chemical waste contamination in Kim Kim River. It is located near to the eastern coast of the Straits of Johore.

Due to its hotspot as pollution sources in Malaysia, the Straits of Johore have been constant investigated and monitored in particular for heavy metal pollution by using surface sediments (Yap et al., 2002, 2003a, 2007, 2010; Maadin et al., 2016) and the green-lipped mussel *Perna viridis* (Yap et al., 2006, 2012, 2013a, 2013b; Mahat et al., 2018).

A lot of monitoring studies near and around Kampung Pasir Puteh (KPPuteh) located near Pasir Gudang, has been conducted as judged from the many scientific papers published in the literature. Wood et al. (1997) reported geochemistry of sediments in the Straits of Johore. Abdullah et al. (1996) reported Distribution of oil and grease and petroleum hydrocarbons in the Straits of Johore. Zulkifli et al. (2010) categorized the Straits of Johore as hotspot of trace metal contamination. Most recently, Maadin et al. (2006) directly reported elevated levels of Cu and Zn in the sediments collected from KPPuteh.

Based on 6 sampling sites of sediments collected between November 2015 and March 2016, Maadin et al. (2016) reported Cu concentration in sediment was 19.5 to 146.5 µg/g while zinc concentration was in the range of 147.0 to 560.2 µg/g. These two metal ranges exceeded the allowable limit stated by Canadian Sediment Quality Guidelines (Cu: 108 µg/g; Zn: 271 µg/g). This has further confirmed that the point sources of pollution at Sungai Kampung Pasir Puteh are still going on. Based on observable activities in the surrounding during our sampling experiences from 2002 to 2009, these sources are suspected to be untreated/semi-treated effluents from factories contained chemicals. Of course, domestic urban wastes from nearby villager house and restaurants cannot be ruled

out as well. Non-point sources pollution such as oil pollution from shipping activities and coastal development as well as soil erosion also would affect the water quality along Straits of Johor (Maadin et al., 2016).

Examples of biomonitoring of chemical pollutants in the mussels from Pasir Gudang areas have been widely published in the scientific literature. Keshavarzifard et al. (2018) investigated distributions, composition patterns, sources and potential toxicity of polycyclic aromatic hydrocarbon (PAHs) pollution in surface sediments from the Kim Kim River, Peninsular Malaysia. They concluded that the human health risk assessment applying Cancer Riskingestion and Cancer Risk dermal indicated that probabilistic health risk to humans via ingestion and dermal pathways from sediments of the Kim Kim River can be categorised as low-to-moderate risk. Yap et al. (2007) collected surface sediments from a drainage of petrochemical site in Pasir Gudang (Johore) in 2005 and found high contamination by Cu, Zn, Ni and Pb. Yap, *et al* (2002, 2003) reported that Kg. Pasir Puteh (near Pasir Gudang) at Johore were identified as metal-polluted sites in Malaysia.

Abdo Alkhadher e al. (2016) investigated the distribution and sources of linear alkyl benzenes (LABs) were evaluated in surface sediments collected from Johor Bahru Coast and the Kim Kim River. The ratio of internal to external isomers (I/E ratio) of LABs in sediment samples from Johor Bahru Coast and the Kim Kim River stations indicate that the areas were receiving primary and secondary effluents.

Based on samples collected in January–March 2015, Mahat et al. (2018) studied the heavy metal levels in mussels *P. viridis* collected from Kg. Pasir Puteh (near Pasir Gudang). It is the major harvesting site in Malaysia. They reported that the concentrations for Pb and Cd in *P. viridis* exceeded the maximum permissible limits of Cd and Pb by Malaysian Food Regulations 1985. Based on target hazard quotient values, both Pb and Cd exceeded 1. This indicated possible detrimental health impacts on human for consuming the mussels from Kg. Pasir Puteh. Previously, *P. viridis* collected from Kg. Pasir Puteh has been reported to contain high levels of heavy metals especially Cu in the edible soft tissues of the mussels collected in 2000 (Yap et al., 2003b, 2004a, 2004b), 2005 (Yap et al., 2006) and 2009 (Eugene et al., 2013a, 2013b).

All the three above publications are just for scientific information for public knowledge but received no

practical follow up from related agencies and department of environment from the governing bodies.

HUMAN HEALTH IMPLICATIONS IN PASIR GUDANG AREA

Beginning March 7 2019 with subsequent cases of health problems (breathing difficulties, dizziness, nausea and vomiting) among the school children especially, Malaysia has a shocking news on river pollution due to illegal dumping as hazardous chemical wastes into Kim Kim River in Pasir Gudang, Johore. According to Borneo Post Online (15 March 2019), ‘Chemical pollution which affected more than 2,000 people, and caused 111 schools in Pasir Gudang to be ordered closed, believed to have been caused by toxic waste dumped into Kim Kim River on March 7, 2019.’

Until March 16, 2019, around 143 victims of the incident were still hospitalized and needed attentive treatment (Bernama, March 17, 2019). Bernama (March 19, 2019) reported that the Kim Kim River has been confirmed to be safe following a massive clean-up operation by various agencies. The Edge Markets (March 25, 2019) reported that two directors of a used tyre processing company were each charged at the Sessions Court involving the disposal of scheduled chemical wastes in Kim Kim River.

NO FOLLOW UP FROM THE GOVERNING BODIES

The news about Kim Kim River chemical waste contamination will only provide information to people ranging from babies, school children to governmental officials of DOE. According to Lokman (NST, 2019), ‘The dumping of toxic waste in Kim Kim River has apparently been happening for years. Long suffering residents have alerted the authorities to the matter, but it seems nothing has been done to address it.’

However, the news about Kim Kim River chemical waste contamination that involving human life and dead conditions have eventually culminate to public attention and worrisome, again ranging from all walks of lives from babies to the prime minister of Malaysia. The chemical waste contamination incident in Pasir Gudang does point the immediate response from the governing bodies especially from the state government that approved an emergency allocation of RM6.4 million as instant aid mainly for cleaning works and to be given to the victims exposed to the dangers of the pollution. (Borneo Post Online, 15 March 2019).

CONCLUSIONS AND RECOMMENDATIONS

The scientific reporting monitoring data in the scientific literature is just a knowledge sharing without any practical implications. Complaints from the public and scientific reports have little attraction to the governing bodies or sometimes can be easily ignored or put under waiting list. Only heavy pollution cases involving human health implications would trigger governing bodies' immediate actions as in the case of Kim Kim River pollution.

It is recommended that reports of scientific monitoring data should be treated with high importance and governing bodies should be working closely with those researchers for the benefits of public at large. Any suspected sources of illegal dumping of chemical wastes into our waterways (rivers and drainages) should be closely monitored and polluters should be penalized. Stricter laws and regulations with effective management of clean river sustainability can be implemented. Therefore, it is highly recommended that 'Polluters Pay Principle' should be fully adopted by all means in Malaysia once our rivers are found with scientific proofs of hazardous chemical contamination. This principle is the commonly accepted practice that those who produce pollution should bear the costs of managing it to prevent damage to human health or the ecosystem health.

Finally, it is to be noted that any complaints from the public should be taken into serious consideration for further actions by the Malaysian Department of Environment (DOE). This is important so as to avoid the repetition of the same environmental disaster at Kim Kim River pollution in other DOE identified polluted rivers in Malaysia. Perhaps, this is the main lesson to be learnt.

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